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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,833	12/31/2001	Mac Apodaca	42P13085	4943

7590 11/18/2003
Trop Pruner & Hu PC
8554 Katy Freeway
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EXAMINER

LEE, HSIEN MING

ART UNIT PAPER NUMBER

2823

DATE MAILED: 11/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/036,833	APODACA ET AL.	
	Examiner	Art Unit	
	Hsien-Ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7, 11 and 13-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7, 11 and 13-31 is/are rejected.
- 7) ☐ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 7/21/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Remarks

1. The objection to claim 2; 112-second-paragraph rejection to claim 11; 102(e) rejection to claims 1-5 and 8-10; and the indication of allowability are withdrawn.
2. Applicants' cancellation to claims 6, 8-10 and 12 is acknowledged. Claims 26-31 are newly added.
3. Claims 1-5, 7, 11 and 13-31 are pending in the application.
4. The objection to claim 24 has **not** been resolved although claim 24 was amended.

Claim Objections

5. Claim 24 is objected to because of the following informalities: lacks antecedent basis, i.e. "said insulator." It should be -- said dielectric material --.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-5, 7, 11 and 13-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu (US 2003/0073295) in view of Lin et al. (US 5,897,352).

In re claims 1-5, 7, 11, 13, 15-18 and 26-31, Xu, in Fig. 7 and related text, teaches the claimed apparatus (i.e. a phase-change memory cell) comprising: a dielectric layer 16/20, wherein 16 is silicon dioxide; an adhesion layer (not shown but taught in paragraph [0026]) on the

dielectric layer 16/20; and a phase-change material 24 on the adhesion layer, wherein the phase-change material 24 comprises chalcogenide alloys such as GeSbTe (paragraphs [0005], [0018]).

In re claims 19-25, Xu, in Fig.7 and related text, also teaches the claimed method comprising: forming an interfacial layer (i.e. the adhesion layer); forming a phase-change material 24 over the interfacial layer; forming the interfacial layer over an insulator or dielectric material 16-20; forming an opening through the interfacial layer and the dielectric material; and forming the phase-change material 24 over the interfacial layer in the opening.

Xu does not teach that the adhesion layer and the interfacial layer comprising hemispheric grain polysilicon (HSG) and having three-dimensional grains, respectively.

However, HSG has been used as adhesion layer for the adjacent layers in the application of memory device, as evidenced by Lin et al. (abstract and col. 5, lines 23-26). The HSG, which comprises silicon, as illustrated in Figs 6-8 in Lin et al. have known to have the rough surface and three-dimensional grains.

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to use the HSG, as suggested by Lin et al. in the apparatus of Xu, since by doing so it would promote the adhesion between the phase- change layer 24 of Xu and the underlying dielectric layer 16/20 of Xu.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Hsien-Ming Lee
Examiner
Art Unit 2823

Nov. 12, 2003

A handwritten signature in black ink, appearing to be 'Hsien-Ming Lee', written in a cursive style.